REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on January 29, 2003, and the references cited therewith.

Claims 25, 30, 39 and 41 are amended, claim 33 is canceled, and claims 45-51 are added; as a result, claims 1-32, 34-39 and 41-51 are now pending in this application.

§112 Rejection of the Claims

Claim 23 was rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant believes that the language is sufficiently clear to enable one of average skill in the art to understand what is being claimed. The sacrificial wire is not removed with removal of the other portions of the sacrificial layer.

Claim 23 recites that the sacrificial layer is thicker between the base and the sidewall: "the thickness of the thin film at the base of the sidewall having an increased thickness and width to form a sacrificial wire along the base". Also, the next element makes it clear that only part of the sacrificial layer is removed: "removing by an unmasked RIE the thin film sacrificial layer on the sidewall and on the substrate, **while leaving said sacrificial wire along said base"** emphasis added. RIE has an associated etch rate, and it is clear that if the etch is stopped after the layers on the sidewall and substrate are removed, the thicker portion between the sidewall and substrate (the base) will still be present, forming the sacrificial wire.

§102 Rejection of the Claims

Claims 1-2, 20-22, 25-26 and 43 were rejected under 35 USC § 102(b) as being anticipated by Tai et al. (U.S. Patent No. 6,146,543). This rejection is respectfully traversed. Among the differences, the polysilicon layers in Tai et al. are patterned to produce openings such as contact window 350 and openings 353 per Col. 4, lines 24-47. They are not patterned to define "the shape of a desired fluid working gap" as recited in claim 1. Actually, in Tai et al. the "nitride structural layer 343 [is] deposited and patterned to define the second layer 140 of the

microbellows membrane 110." Thus, Tai et al. does not teach each and every element of claim 1 and claims 2 and 20-22 which depend from claim 1.

Claim 25 has been amended to describe the formation of nanometer scale flowchannels. The size of such channels result in claimed function not seen in structures created by the process described in Tai et al., which structures are formed on the micrometer scale. Tai et al. also does not describe flowchannels. Therefore, Tai et al. does not teach each and every element of claims 25 and 26.

Claim 43 also recites the formation of a channel on the nanometer scale. The Office Action did not address these elements of claim 43 in the rejection. Thus, a prima facie case of anticipation has not been established. Further, review of Tai et al. by Applicant did not uncover any such teaching. The rejections based on Tai et al. should be withdrawn.

§103 Rejection of the Claims

Claims 1-4, 20-22, 25-26, 27, 28, 30-32, 35, 38, 39 and 43-44 were rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Tai et al. (U.S. Patent No. 6,146,543) in view of and further of Lin et al. (U.S. Patent No. 5,591,139). This rejection is respectfully traversed based on the lack of proper suggestion to combine the references, and that even if combined, the references do not teach or suggest all of the elements of the claims. Further, the rejection lacks sufficient specificity to properly address it, since only claim 2 was explicitly referenced. Applicants have attempted to be responsive with the following remarks.

Mastrangelo et al. uses "polymer-based micromachining technology [that] is vastly superior than those based on wafer bonding bulk micromachining, polysilicon surface micromachining, and hybrid plastic 'circuit board' technology in the following nine categories" Col. 5, lines 19-24. This is followed by a recitation of the nine reasons, why the process is through to be better than silicon based processes. There is no teaching in Mastrangelo et al. of even how to use polysilicon as a sacrificial layer. As indicated in the Office Action, "Mastrangelo also fails etching the sacrificial layer using tetramethyl ammonium hydroxide", further reinforcing that it does not contemplate using polysilicon as a sacrificial layer. Claims 1-

2, 20-22 and 25-26 all refer to a silicon based sacrificial layer, which is directly against the teaching of Mastrangelo et al.

Tai et al. is disclosed as using a sacrificial layer comprising silicon. The reason cited in the Office Action for combining Mastrangelo et al. and Tai et al. is that it would have been obvious to substitute silicon for the sacrificial layer "in order to have a high fracture strain, low modulus material for the ceiling layer and to have a sacrificial layer that has a etch high selectivity over the ceiling layer. It also would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Mastrangelo to form an access hole in the ceiling layer and to deposit a sealing layer on the ceiling layer in order to close the access hole as taught by Lin et al because the formation of the access hole through the ceiling layer are easier to seal and the sealing layer is needed to seal the access hole inn order to fabricate a sealed device." The first reason is not found in the references and appears to be based on hindsight provided by the claims of the current application. Applicants are not aware of the origin of a reason having to do with a "high fracture strain, low modulus material for the ceiling layer". The second reason, that "the formation of the access hole through the ceiling layer are easier to seal" appears to be a statement of subjective belief. The reasons to combine must be found in the references. Such does not appear to the be the case in this rejection.

A factor cutting against a finding of motivation to combine or modify the prior art is when the prior art teaches away from the claimed combination. A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path the applicant took. *In re Gurley*, 27 F.3d 551, 31 USPQ 2d 1130, 1131 (Fed. Cir. 1994); *United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966); *In re Sponnoble*, 405 F.2d 578, 587, 160 USPQ 237, 244 (C.C.P.A. 1969); *In re Caldwell*, 319 F.2d 254, 256, 138 USPQ 243, 245 (C.C.P.A. 1963).

As indicated above, Mastrangelo et al., essentially says it is not a good idea to use "polysilicon surface micromachining". Thus, it is problematic to state that one skilled in the art would combine Mastrangelo et al. with a reference that describes the use of a polysilicon sacrificial layer. In fact, based on the text in Mastrangelo et al., one would be discouraged from

following such a path. Since the references are not properly combinable, a prima facie case of obviousness has not been established, and the rejection should be withdrawn.

Claims 5-7 were rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212), as applied above to claim 1, and further in view of Mastrangelo (U.S. Patent No. 5,258,097). This rejection is also traversed. The characterization of Mastrangelo '097 as producing an artificial gel is traversed. In fact, the function of the posts in Mastrangelo '097 are to provide support during formation of the device. Col. 5, lines 9-17. They are removed as a final step. Col. 5, lines 56-59. In fact, considerable discussion is provided to minimize the number of posts required for such support, starting at Col. 7, line 35. Further, the arguments above regarding Mastrangelo et al '212 Thus, the combination does not teach each and every element of the claims, and the rejection should be withdrawn.

Claims 9-10 were rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) in view of Frazier (U.S. Patent No. 5,871,158). This rejection is respectfully traversed. Claims 9 and 10 both require at least one sacrificial layer to be a silicon material. As indicated before, Mastrangelo et al. does not teach the use of a silicon material for a sacrificial layer. Frazier only recites the use of photo resist being removed to form a hollow microchannel in step 15 in Col. 6, lines 27-29. Thus, the combination of references does not teach the invention as claimed. Still further, the references are not properly combinable. Frazier describes micro channels made of metal, while Mastrangelo et al. forms polymer based channels. The stated reason to combine them: "to form multilevel as taught be Frazier to allow different fluids to flow through different channels" is conclusory at best, and uses the claim as a roadmap. It does not explain where the suggestion is found in the references.

Claims 11-15 were rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Frazier (U.S. Patent No. 5,871,158), as applied above to claim 9, and further of Lin et al. (U.S. Patent No. 5,591,139). Since claim 9, from which these claims depend has been shown to be allowable, claims 11-15 are also believed

allowable as Lin et al. is not cited as providing the elements missing from the references applied to claim 9.

Claims 16-18 and 41-42 were rejected under 35 USC § 103(a) as being unpatenable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Frazier (U.S. Patent No. 5,871,158), as applied above to claim 9, and further of Mastrangelo (U.S. Patent No. 5,258,097). Since claim 9, from which claims 16-18 depend has been shown to be allowable, claims 16-18 are also believed allowable as Lin et al. is not cited as providing the elements missing from the references applied to claim 9.

Claim 41 has been amended to provide a functional aspect of the retarding obstacles based on their size. The size of the obstacles result in a structure that forms an artificial gel for molecular sized elements. As indicated above, this size is much smaller than the size of the devices formed in either of the Mastrangelo et al. patents.

Claims 33 and 34 were rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Lin (U.S. Patent No. 5,591,139), as applied above to claim 31, and further of Tai et al. (U.S. Patent No. 6,146,543). Claim 30 has been amended to incorporate the aspects of claim 33, and is believed to distinguish the references for at least the same reasons as claim 1. Claim 34 depends from claim 30 and distinguishes for at least the same reasons.

Claim 36 was rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Lin (U.S. Patent No. 5,591,139), as applied above to claim 30, and further of Frazier (U.S. Patent No. 5,871,158). Claim 36 depends from amended claim 30 and is believed to distinguish the references as indicated above.

Claims 33 and 34 were rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Lin (U.S. Patent No. 5,591,139), as applied above to claim 30, and further of Vaeth (U.S. Patent No. US2001/0005527). Claim 30 has been amended to incorporate the aspects of claim 33, and is believed to distinguish the references for

at least the same reasons as claim 1. Claim 34 depends from claim 30 and distinguishes for at least the same reasons.

Claim 40 (actually now claim 39) was rejected under 35 USC § 103(a) as being unpatentable over Mastrangelo et al. (U.S. Patent No. 6,136,212) and Lin (U.S. Patent No. 5,591,139), and further of Nakagima et al. (U.S. Patent No. 4,698,407). Claim 39 has been amended to reference polysilicon, and a reference to a nanometer scale working gap, and is believed to distinguish the references for at least the same reasons as claim 1.

Allowable Subject Matter

Claim 24 is allowed.

Claims 8 and 19 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney 612-373-6972 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

HAROLD G. CRAIGHEAD ET AL.

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402
612-373-6972

Date 5-27-2003 By _____
Bradley A. Forrest
Reg. No. 30,837

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Dawn M. Noble _____

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